

and treats the locusts of different countries as, to all intents and purposes, the same insect. His book will no doubt be very useful to agriculturists in countries infested by locusts; but he scarcely allows for the variations in habit which exists between different species. For instance, he observes that the South American locusts are said to breed on the shores of certain lakes in Bolivia, and asserts that if they could be destroyed in this locality they would be exterminated from the whole of South America (!). It is hardly possible to take such a remark seriously; but we may perhaps observe that even if the story were true, it could only be true of one or two species at most. It is also suggested that ophthalmia in Egypt (well known to be spread by flies) may be caused by locusts.

Dr. Munro also claims that his book is the first on the subject; but we are more inclined to think that a locust bibliography would fill a book as large as his own. Besides, some of his illustrations appear to be taken from American works.

An interesting account is given of the appearance of what is called the "new" locust in South Africa, and he quotes from Mr. Péringuey: "The present species was very closely allied to *Acridium peregrinum*, and in the same way that that species had swarmed into Algeria after the myriads of a smaller locust, *Stauronotus* (not *Jauronotus*, as printed) *maroccanus*, had been destroyed at great expense, this present species was following in the rear of a smaller locust, *Pachytylus migratorius*" (§ 166). One curious point is that the "new locust" is said to be unwholesome, if not actually poisonous, by the natives. However, in § 32, under the heading, "Scientific Definition," we read, "the locust we have here (in Africa) is, to all intents and purposes, the same insect called technically the *Acridium peregrinum*, *Locusta migratoria*, or the wandering locust" (Fig. 4a, p. 37). Here it will be seen that two species, by no means closely related, are spoken of as if they were the same; and on turning to p. 37 we find two figures of locusts, specified as "The African Locust" and "The South American Locust," as if there was only one species in each continent.

The book is very diffusely written, and treats of a great variety of subjects, some of them rather irrelevant to the locust question. It is, however, divided into 900 numbered paragraphs, and provided with an excellent index, which will make it a useful book of reference, though it would be rather a formidable undertaking to read it through from cover to cover.

Leçons d'Anthropologie Philosophique, ses Applications à la Morale Positive. Par D. Folkmar. Pp. xiv + 336. (Paris: Schleicher Frères, 1900.)

SCIENCE exists for the sake of something beyond itself. Doing, not knowing, is what determines the place and significance of any body of doctrine in the hierarchy of arts and sciences. The synthesis of the human sciences in the light of their worth for action is not effected by sociology. This fails to include certain individual sciences. In this way Prof. Folkmar makes the transition from the sociological studies, which engrossed him at Chicago, to the philosophical, as opposed to physical, anthropology, which he expounds from his chair at Brussels.

The changed point of view involves an endeavour after a new classification of the sciences of man, a critical determination of the limits of those sciences as hitherto pursued, and a sketch of the unifying conceptions that involves disquisitions psychological, anthropological in the narrower sense, and ethical. To the practical applications of his teaching Prof. Folkmar proposes to devote his life.

Dr. Folkmar may be described as Spencerian, though critically so. He rests much on Letourneau, and has studied in the following of Giddings, Lester Ward and

other of the "new sociologists." He owes something to Guyau. He exhibits on the whole a sober judgment, and is frequently suggestive in his treatment even of well-worn topics. It is therefore the more to be regretted that he has almost buried good work among platitudes, second-hand matter and pretentious technical phraseology, doubtfully permissible in his *conférences* and inadmissible in the *littera scripta* meant to endure.

Terms such as *anthropographie* (of which different misprints occur, pp. 71, 72), *archéographie* (which means ancient geography), and *praxéologie* detract from the merit of Dr. Folkmar's graphic representation, upon the faces of a cube, of the sciences of man. His much use of the word "innervation," defined as meaning simply "a form of vibration of the nervous tissues," is a weakness of the same kind. Nothing, surely, is gained by declaring the question of the unitary origin of the race to be "on ultimate analysis the question of monogenism *versus* polygenism" (p. 127).

More serious in a work of scientific pretensions is what we take to be a missing of the main point with regard to polyandry in the remark (p. 188) that where it obtains many women must needs remain unmarried. That completeness of life can be determined with mathematical exactness (p. 319) needs proof. In an otherwise ingenious suggestion for a grading of scientific asseveration "impossible" (p. 67, line 24) is impossible, and "improbable," which is not improbably the right reading, will not balance the "probable" which has preceded.

In fine, though Dr. Folkmar's ability to supply a text-book of anthropology as he conceives it will not admit of question, and an essay from his pen developing, say, the conception which he would substitute for Mr. Spencer's ethical ideal might prove instructive, his present book suggests the high-class amateur who enters for the first time in a tournament of masters.

H. W. B.

The Principles, Construction and Application of Pumping Machinery. By Henry Davey. Pp. xvi + 295; 250 illustrations. (London: Charles Griffin and Co., Ltd., 1900.)

THE purpose of this book, as stated by the author, is to present information on pumps and pumping machinery in such a form as to make it useful to the practical engineer engaged in the application of pumping machinery in mines and for waterworks, or in other positions where large quantities of water have to be dealt with. This purpose has been fairly accomplished. The information given is of a thoroughly practical character and made plain by numerous illustrations, and the book cannot fail to be of great use either to the student seeking information or to the practical engineer engaged in works requiring pumping machinery.

The first chapter contains an interesting summary of the gradual development of pumping machinery. Cornwall may be said to be the land of the birth of large pumping installations. It was here that both Savery and Newcomen brought into use the power of steam for raising water from the mines, and their engines remained in use until Watt introduced the system of a separate condenser. It is not much more than a century and a quarter ago that Boulton and Watt commenced the manufacture of their engines for the coal-mines in Staffordshire and Warwickshire, but it was Cornwall that afforded the great field for the development of Watt's inventions. The progress of this development is interesting. The coal-mines were becoming deeper and very costly to drain. The proprietors were unwilling to incur the expense of removing the old atmospheric engines put down by Newcomen; and to meet this difficulty Boulton and Watt erected many engines at their own expense, taking as payment one-third of the

saving effected in raising the coal. At one mine where three of Watt's engines were erected the proprietors engaged to pay 800*l.* a year for each engine as a compromise for the third part of the saving in coal.

It was with the Cornish engine that the principles governing steam engine economy were first grappled with; and with the engines used for all purposes on land, pumping engines, even at the present day, are worked with the greatest economy of fuel, examples being given where the engines are worked with an expenditure of less than 2 lbs. per I.H.P. It is interesting to note the change of pressure at which steam is worked now, reaching to 150 lbs. on the square inch, as compared with the 5 lbs. used in many of the old Boulton and Watt engines. These engines were not confined to pumping water from mines, but were applied to reclamation purposes, many of the Boulton and Watt engines, made a century ago, being still in use in the fens of Lincolnshire and Cambridgeshire. These machines were noted for their massive construction and the excellency of the workmanship, as attested by the number of years during which they have done good service.

The other fourteen chapters into which the book is divided deal with descriptions of the various types of pumping engines in use; pumps and pump valves; pit work; shaft-sinking; hydraulic transmission of power in mines; valve gears; waterworks engines; trials of pumping engines; centrifugal and low lift pumps, with descriptions of some of the scoop wheels in use in Holland; hydraulic rams and pumping mains.

Elements of Hydrostatics. By S. L. Loney, M.A. Pp. viii + 248 + xii. (Cambridge: University Press, 1900.)

"ELEMENTS OF HYDROSTATICS" is a subject the limits of which are sufficiently well known to require little definition. In the present instance it includes a fairly complete treatment of centres of pressure of rectilinear areas and circles by what used to be called, at Cambridge, "three-day methods"—also sections on rotating liquids and on tensions of vessels and curves of buoyancy. The book will do admirably for the ordinary run of students preparing for examinations in this subject, and the copious problems and examples should commend it to science students; but there are one or two points in which improvement is desirable. "Whole pressure" has been too long a fetish of the third-rate schoolmaster, who "thinks he is wise when he is not." But instead of banishing this misleading idea to a few lines of small print (or, better, omitting it altogether), and replacing the term "whole pressure" elsewhere by "*resultant thrust* on a *plane area*," Prof. Loney makes confusion worse confounded by speaking, so far as we can make out, indiscriminately of "whole pressure," "whole pressure or thrust" and "whole thrust." Again, there is no reason why we should be left in the dark as to the precise distinction between a perfect fluid and an ordinary fluid, or the reason why the principles of hydrostatics apply with sufficient approximation to the latter; these points are hinted at, but might with advantage be stated more explicitly. The usual figure of the air-condenser, with its valves hanging in an impossible position, is once more reproduced.

There are, to our knowledge, many highly successful teachers who, in their ignorance, persist in their preference for misleading methods of dealing with such notions as "whole pressure," the "parallelogram of velocities," the "binomial theorem" and the like. There are few writers better qualified to prove that scientific accuracy is not incompatible with a successful text-book than Prof. Loney, whose name alone is sufficient to ensure a large circulation for his works. Why, too, does not the Cambridge University Press rise superior to pandering to the fancy of those mathematical masters who know no better?

Minéralogie Agricole. By F. Houdaille. Pp. 299, avec 107 figures dans le texte. (Paris: Félix Alcan, 1900.)

THE object of this little work is to provide agriculturists and others with a knowledge of the properties, physical and chemical, of the minerals important to man, either as constituents of rocks and soils, as fertilisers or as sources of materials used in the arts. The author assumes ignorance of physics, chemistry and crystallography on the part of the reader, and as the descriptive portion of the book would be unintelligible without some knowledge of these subjects, he attempts to give the necessary smattering in an introduction of eighty-nine pages. The laws of crystallography and modern views of crystal structure are dealt with in forty pages, illustrated by a number of indifferent figures, some of which, notably the rhombohedron of Fig. 8, entirely fail to produce on the eye the effect which the author presumably intended. In the chemical section the old equivalent notation is preferred to that usually accepted at the present day; thus, sodium carbonate *receives* the formula $\text{NaO}, \text{CO}_2 + 10\text{H}_2\text{O}$! A considerable portion of the space devoted to analysis is occupied by a picture of an elegant gentleman puffing languidly with a blow-pipe at a long candle fixed in an equally tall candlestick. The rest of the book contains a selection of facts about minerals which can be found in any treatise on descriptive mineralogy, together with some useful information as to methods of determining the permeability of soils and the percentage of calcium carbonate contained in them. We fear, however, that the work will hardly be found readable by any one who has not already had an extensive training in chemistry and mineralogy. It is therefore unlikely to be of much value to the class for whom it appears to be intended, nor can it be recommended to the serious student.

Engine-Room Practice. A Handbook for the Royal Navy and Mercantile Marine. By John G. Liversedge, R.N. Pp. xi. + 292. (London: Griffin and Co., Ltd., 1899.)

MR. LIVERSEDGE'S handbook will be found by all engineers to be a very useful supplement to the more technical treatises of Mr. Seaton and of Messrs. Sennet and Oram. It lays down the whole duty of a marine engineer, and more particularly of a naval engineer, from the day when he receives notice of his appointment; and it is throughout well-written, full, and admirably to the point. The running of the main engines and the care of the boilers are, of course, the chief concerns of the book; but the auxiliary machinery is also well looked after, and there are separate chapters on the electric light, the hydraulic, the refrigerating and the air-compressing plants. The chapter on adjustments and repairs seems to us of especial value, for while a successful repair at sea is often the outcome of what seems an inspiration, its success may at any time be assured by a knowledge of what has been done in similar cases.

We could wish, especially in the present season of divergent opinion on the matter, that the water-tube boiler had received somewhat greater attention. A few pages at the end of the book are specially contributed by Fleet Engineer Edwards, of H.M.S. *Powerful*, and perhaps it were unwise to do more until fuller experience has been gained; but we may expect to see the matter thoroughly taken up in later editions, for no unprejudiced observer can doubt that the water-tube boiler, in one form or another, has come to stay.

While Mr. Liversedge's book is primarily a professional handbook, it will be found, at the same time, to interest all who have any acquaintance with the engineering side of naval life, even though they may have but a superficial knowledge of the ordinary equipment of a ship's engine-room.